

## ANSWERS: Indicators

### 1) Explanations

When the solution is red, the pH is 1–2. The colour is due to a high concentration of  $\text{H}^+$  ions.

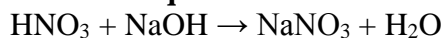
When the solution is green, the solution is neutral pH 7 and the hydroxide ions have reacted with the hydrogen ions, forming water.

When the solution is purple, the pH is 12–13 and there is a high concentration of hydroxide ions.

### Word equation

Nitric acid + sodium hydroxide  $\rightarrow$  sodium nitrate + water

### Balanced equation



### 2) a) Water – red and blue

NaOH – blue and blue

HCl – red and red.

### b) Water – 7

NaOH between 9 and 14.

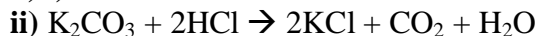
HCl between 0 and 3.

### 3)a) red

green / blue

blue / purple

### b) i) Bubbles form



### c) At the beginning – red due to HCl (acidic)

- at neutralisation – yellow / green due to NaCl and  $\text{H}_2\text{O}$  (or no HCl) present beyond neutral point – blue with NaCl and NaOH present (basic).

### 4) a) i) yellow, green, blue (all required in order)

ii) Red

iii) NaOH increases the pH by neutralising or cancelling out the acid.

Low pH means more acid (*hydrogen ions*) :

As the NaOH base added, acid is neutralised / canceled out reaching pH 7 / neutral : more NaOH increases further / pH = 11+.  
*Correct use of 'neutralises' required. Reference to H<sup>+</sup> ions not reqd.*

**5)a) i)** red blue

**ii)** red blue

**b) i)** oven cleaner

**ii)** lemon juice

**iii)** Toothpaste is basic/alkaline OR neutralises the acid.